

## **REMARKS**

In the Action, claims 1-4 are rejected. In response, claims 1 and 4 are amended to correct the clerical matters noted in the Action.

The pending claims in this application are claims 1-4, with claim 1 being the sole independent claim. In view of this amendment and the following comments, reconsideration and allowance are requested.

### **The Rejection**

Claims 1-4 are rejected under 35 U.S.C. § 102(b) as being anticipated by or in the alternative under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,720,374 to Sashida et al. Sashida et al. is cited for disclosing an aliphatic polyester composition and a polyglycerol acetic ester as a plasticizer.

Sashida et al. does not disclose or suggest to one skilled in the art the combination of an aliphatic resin and a plasticizer comprising a glycerol fatty acid ester where (1) the acyl group has 2 to 18 carbon atoms, (2) the total of carbon atoms of the acyl groups is 10 to 22 and (3) the glycerol fatty acid ester has an average acylation rate of 50 to 90%. As noted in the Action, Sashida et al. does not disclose the average acylation rate either alone or in combination with the claimed acyl groups.

Applicants respectfully submit that one skilled in the art would recognize that the glycerol fatty esters of Sashida et al. do not have an acylation rate of 50 to 90% as in the claimed invention. Furthermore, Sashida et al. does not disclose the combination of the glycerol fatty ester having a total number of carbon atoms of 10 to 22 in the acyl groups and an average

acylation rate of 50 to 90% or the advantages of these characteristics in a polyester resin composition. Column 4, lines 18-22 of Sashida et al. specifically discloses the acetyl group of the glycerol acetic fatty ester being 2 mol or less on average with respect to 1 mol of glycerol. The acyl group has an average carbon number of 8 to 22, and preferably 8 to 18, and is used in an amount of 1 mol or more on average with respect to 1 mol of glycerol. This passage further discloses that the hydroxyl group value of the compound is preferably 20 or less and that the compound is liquid at room temperature.

The properties of the glycerol fatty acid ester of Sashida et al. result in an esterification ratio which corresponds to an acylation rate of 96.2% for glycerol diacetomonolaurate having a hydroxyl value of 20. Thus, a hydroxyl value of 20 or less as specifically disclosed in Sashida et al. results in an esterification ratio or average acylation rate of greater than 90%, which is outside the claimed range. As recognized by those skilled in the art, as the hydroxyl value decreases, the esterification ratio or acylation rate increases. Thus, the compounds disclosed in Sashida et al. do not have an acylation rate within the claimed range. Sashida et al. specifically discloses that the glycerol fatty esters have a hydroxyl value of 20 or less, and thus, an acylation rate greater than 90%.

In view of the above, it would not have been obvious to one skilled in the art to provide a plasticizer for an aliphatic polyester resin where the plasticizer is a glycerol fatty acid ester having a total of 10 to 22 carbon atoms for the acyl groups where each acyl group has 2 to 18 carbon atoms and has an average acylation rate of 50 to 90%. Furthermore, the specific compounds disclosed in Sashida et al. have an esterification ratio or acylation rate of essentially 100%. For example, as disclosed in claim 14 of Sashida et al. the plasticizers include glycerol

diacetomonocapirate, glycerol diacetomonolaurate and glycerol diacetomonooleate having a total of 12, 16 and 22 carbon atoms, respectively, where each compound has an esterification ratio of 100%. Therefore, Sashida et al. does not disclose a specific example of a glycerol fatty ester that falls within the scope of claim 1.

As disclosed on page 2, lines 20-26 of the present specification, the present invention is directed to a thermoplastic resin composition which contains a plasticizer having a high flexibility, high transparency, little bleed out and high extraction resistance to a paraffinic solvent. Page 3, line 25 to page 4, line 1 discloses that the sheet, film or molded product comprising the aliphatic polyester resin composition of the invention has high solvent resistance to paraffinic solvents. The resulting sheet, film or molded product has little migration of the plasticizer to the food even when the sheet, film or molded product is used with oily foods. Sashida et al. does not disclose the advantages of these aspects of the present invention. Furthermore, the composition of Sashida et al. does not exhibit the low migration of the plasticizer as in the claimed invention.

The claimed acylation rate is not an arbitrary value, but rather provides unexpected and unpredictable advantages. Referring to Table 1 and Table 2 of the specification on pages 12 and 14, respectively, the test data demonstrates the advantages of the claimed invention. For example, the compound of Comparative Sample 5 is calculated to have an average acylation rate of 99% and a total number of carbon atoms in the acyl groups being 11.9. As shown in Table 2, this compound results in an unacceptable solvent extraction and results in bleeding of the plasticizer from the resin. Similar results are also shown for Comparative Samples 1 and 3 which have an acylation ratio outside the claimed range and Comparative Examples 2 and 4

which have a total number of carbon atoms in the acyl groups outside the claimed range. One skilled in the art would not reasonably recognize or expect the improved solvent extraction properties and reduced bleeding from the resin as a result of the plasticizer having a total number of carbon atoms in the range of 10 to 22, and an average acylation rate of 50 to 90%. Accordingly, the data supports the unexpected properties and the unobviousness of the claimed invention.

The solvent resistance to paraffinic solvents by the aliphatic polyester resin composition is based on two factors. The first factor relates to the compatibility of the plasticizer with the resin. Applicants have found that the plasticizer having acyl groups with a total number of carbon atoms within the claimed range are particularly compatible with the resin. Applicants have further found that glycerol fatty esters having acyl groups with 20 or more carbon atoms or fewer than 2 carbon atoms are not sufficiently compatible with the resin to prevent bleeding and exhibit an unacceptable solvent extraction rate.

The solvent resistance to paraffinic solvents of the composition is also dependent on the solvent properties of the plasticizer itself in the solvent. The glycerol fatty acid ester as shown in Comparative Sample 5 having an esterification ratio or acylation rate of 100% with substantially all of the hydroxyl groups of the glycerol esterified results in a lowering of the polarity similar to the paraffinic oil. Therefore, the glycerol fatty acid ester of Comparative Sample 5 has properties similar to the non-polar solvent such as heptane, such that the solvent resistance is very low.

Applicants unexpectedly discovered that the solvent resistance in paraffinic solvents is improved by the present invention. Specifically, Applicants discovered that the solvent


resistance to paraffinic oils is related to the combination of (1) the total number of carbon atoms and (2) the average acylation rate of 50 to 90% as in the claimed invention.

Based on the disclosures of Sashida et al. and the above comments, Sashida et al. does not disclose or suggest the claimed average acylation rate either alone or in combination with the total number of carbon atoms of the acyl groups of the glycerol fatty ester. Therefore, independent claim 1 is not anticipated by or obvious over Sashida et al.

Claims 2-4 are also allowable as depending from an allowable base claim and for reciting additional features of the invention. Sashida et al. does not disclose the glycerol fatty ester having at least one acyl group with 8 to 18 carbon atoms as in claim 2, the aliphatic polyester resin being a lactic acid polyester as in claim 3, or sheets and films molded from the aliphatic polyester resin composition as in claim 4, in combination with the features of claim 1. Therefore, these claims are also not anticipated by or obvious over Sashida et al.

For the reasons discussed above, the claims are submitted to be allowable over the art of record. Accordingly, reconsideration and allowance are requested.

Respectfully submitted,

  
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Mark S. Bicks  
Reg. No. 28,770

Roylance, Abrams, Berdo & Goodman, L.L.P.  
1300 19th Street, NW, Suite 600  
Washington, DC 20036  
(202) 659-9076

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